

REMARKS

Reconsideration and withdrawal of the rejections of record are respectfully requested.

Summary of Status of Amendments and Office Action

In the present amendment, claims 1, 3, 32 and 35 are amended, claims 2, 33 and 34 are canceled, and no claims are added. Therefore, claims 1, 3-32 and 35 are pending in the application, with claim 1 being the only independent claim.

The Office Action rejects claims 6-8, 11, 22, and 33-35 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject which applicant regards as the invention.

The Office Action also rejects claims 1, 6, 8, 11, 25, 26, 30, 31, and 33-35 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,424,467 to BAM et al. (hereinafter "BAM").

The Office Action also rejects claims 1-3, 5-11 and 31-35 under 35 U.S.C. §103(b) as being unpatentable over U.S. Patent No. 4,275,012 to KOKUBO et al. (hereinafter "KOKUBO").

The Office Action also rejects claims 27-29 under 35 U.S.C. §103(b) as being unpatentable over BAM in view of U.S. Patent No. 4,655,879 to BROCKMAN et al. (hereinafter "BROCKMAN").

The Office Action also rejects claim 4 under 35 U.S.C. §103(b) as being unpatentable over KOKUBO in view of U.S. Patent No. 5,388,905 to AKE et al. (hereinafter "AKE").

The Office Action also rejects claim 12 under 35 U.S.C. §103(b) as being unpatentable over KOKUBO in view of U.S. Patent No. 3,614,069 to MURRAY (hereinafter "MURRAY").

The Office Action also rejects claims 13 and 24 under 35 U.S.C. §103(b) as being unpatentable over KOKUBO in view of U.S. Patent No. 2,543,055 to POOL et al. (hereinafter "POOL").

The Office Action also rejects claims 14-23 under 35 U.S.C. §103(b) as being unpatentable over KOKUBO in view of POOL and further in view of U.S. Patent No. 5,482,633 to MULDIHARA et al. (hereinafter "MULDIHARA").

The Office Action also rejects claims 25-30 under 35 U.S.C. §103(b) as being unpatentable over KOKUBO in view of BROCKMAN.

Response to Rejection Under §112, Second Paragraph

Claims 6-8, 11, 22, and 33-35 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject which applicant regards as the invention.

Claims 6, 7, 8 and 11 are rejected for reciting limitations that are unclear as to structural elements. Specifically, regarding claim 6, the rejection asserts that the phrase "the reaction section comprises a dynamic emulsifier" is unclear as to structural elements that characterize a "dynamic emulsifier." Regarding claim 7, the rejection asserts that the phrase "the reaction section comprises a crack emulsifier" is unclear as to structural elements that characterize a "crack emulsifier." Regarding claim 8, the rejection asserts that the phrase "the reaction section comprises a turbulator" is unclear as to structural elements that characterize a "turbulator." Regarding claim 11, the rejection asserts that the phrase "the reaction section comprises a cavitation emulsifier" is unclear as to structural elements that characterize a "cavitation emulsifier."

In response, it is noted that the claims are clear as written, and that there is no requirement to additionally recite structural elements that characterize the respective elements. All that is required is that the person of ordinary skill in the art understand what is meant by the corresponding terms. The rejection does not assert that the terms themselves are unclear, nor does the rejection assert that the terms would not be understood by the person of ordinary skill in the art. Moreover, the rejection tacitly admits that the terms are completely clear to the person of ordinary skill in the art by the rejection's own use of the very same terms in the art-based rejections of the claims. Accordingly, it is respectfully submitted that claims 6, 7, 8 and 11 are clear as written, and that there is no requirement to recite yet additional structural limitations. Thus, these rejections are improper, and should be withdrawn.

Regarding claim 22, the rejection asserts that it is unclear where the structural limitation "the pore size is 5-200 nm" is disclosed in the specification. In response, the specification is amended to explicitly include this recitation from the originally-filed claim. Accordingly, this rejection should be withdrawn.

Regarding claim 33, the rejection asserts that the term "liquid" lacks proper positive antecedent basis. As the present amendment cancels claim 33, it is respectfully submitted that this rejection should be withdrawn as moot.

Regarding claim 35, the rejection asserts that the term "surplus methanol" lacks proper positive antecedent basis. The rejection also asserts that the claim is unclear as to the structural relation of "a flash reactor" to the other elements of the apparatus. In response, the claim has been amended to change the recitation of "methanol" to "alcohol." Moreover, the claim now more clearly

recites that the flash reactor is downstream of the reaction section. This was already inherent in the specification and claim. Moreover, the person of ordinary skill in the art would understand that "surplus alcohol" refers to unreacted alcohol, which necessarily refers to downstream of the reaction section.

Accordingly, it is respectfully requested that the rejection of claims 6-8, 11, 22, and 33-35 under 35 U.S.C. §112, second paragraph, be withdrawn.

Response to Rejection Under §102(b)

Claims 1, 6, 8, 11, 25, 26, 30, 31, and 33-35 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,424,467 to BAM.

In response, the Examiner is reminded that the independent claim, as amended, recites an apparatus for producing fatty acid methyl ester, comprising: at least one container for fats; a tank for alkaline solution; a tank for alcohol; a mixing vessel for compounding the alkaline solution and the alcohol; ***a reaction section which comprises a static mixer*** and is connected to the at least one container and the mixing vessel through ***a high pressure pump for introducing the fats and the alkaline solution to the reaction section***; and a separation unit downstream from the reaction section.

BAM does not disclose a reaction section comprising a static mixer. The mixer in the reaction section of BAM is only taught to be a dynamic mixer. See, e.g., BAM at column 6, lines 33-40, as well as Figures 1-4. According to the present invention, it was unexpectedly found that a static mixer could produce powerful dynamic turbulence for transesterification with a simple device. See, e.g., page 7, lines 18-21.

Moreover, BAM does not disclose a high pressure pump for introducing the fats and alkaline solution to the reaction section. BAM merely states that alcohol and catalyst are introduced into the reactor. See, e.g., BAM at column 4, lines 22-24. See also BAM at column 7, lines 10-13, where BAM states that vegetable oil and alcohol can be introduced into the reactor via pumps or gravity feed tanks. Applicants have not located any place where BAM teaches or suggests an apparatus comprising a high pressure pump to introduce fats and alkaline solution into the reactor. Moreover, according to the present invention, it was surprisingly found that such a high pressure pump has proven advantageous for transesterification. See, e.g., page 11, lines 13-16.

Because BAM does not teach or suggest all limitations of pending claim 1, it is respectfully requested that the rejection of claim 1 as anticipated by BAM be withdrawn. Moreover, because dependent claims 6, 8, 11, 25, 26, 30, 31, and 33-35 all recite additional patentable subject matter, the rejection of these claims as anticipated by BAM should also be withdrawn.

Response to Rejection Under §103(a)

Claims 1-3, 5-11 and 31-35 are rejected under 35 U.S.C. §103(b) as being unpatentable over KOKUBO. The rejection asserts that KOKUBO discloses an apparatus comprising at least one container for fats, a tank for catalyst solution, a tank for alcohol, a mixing vessel for compounding the catalyst solution and alcohol, a reaction section, and a separation unit downstream from the reaction section. Although the rejection acknowledges that the catalyst of KOKUBO comprises an acid solution instead of the presently recited alkaline solution, the rejection asserts that the disclosed tank is structurally capable of holding a different catalyst solution.

In response, it is noted that claim 1 as amended now additionally recites, among other features, a reaction section comprising a static mixer. KOKUBO does not disclose a reaction section comprising a static mixer. The reaction section of KOKUBO is only taught to comprise a dynamic mixer. Specifically, KOKUBO teaches a multistage reaction tank divided into at least two chambers, each having a stirring devise comprising stirrer blades. See, e.g., KOKUBO at column 4, lines 7-18, and Figures 3 and 4. It would appear that this special reaction device is an essential feature of the KOKUBO invention. See, e.g., KOKUBO at column 3, lines 50-53. Thus, KOKUBO does not teach or suggest an apparatus in which the reaction section comprises a static mixer. Indeed, it would appear that KOKUBO teaches away from such an apparatus. Moreover, as noted above, Applicants have obtained unexpected results from an apparatus comprising such a static mixer.

Moreover, KOKUBO does not teach or suggest a high pressure pump for introducing the fats and the alkaline solution to the reaction section. KOKUBO does not teach or suggest such a high pressure pump. In this regard, it is noted that Applicants have identified only two places where KOKUBO discusses introduction of liquid into the reaction column. At column 4, lines 29-31, it is stated that the oil or fat, acid and alcohol are "fed" through the top of the reaction column, where they "flow downwards." At column 8, lines 25-28, it is stated that flow rate through the aperture (apparently referring to the reaction column inlet) is controlled to avoid flow backward. Neither of these teachings appears consistent with use of a high pressure pump. Thus, KOKUBO does not teach or suggest an apparatus comprising a high pressure pump for introducing the fats and the alkaline solution to the reaction section. Moreover, as noted above, Applicants have obtained unexpected results from an apparatus comprising such a high pressure pump.

Because KOKUBO does not teach or suggest all limitations of pending claim 1, it is respectfully requested that the rejection of claim 1 as unpatentable over KOKUBO be withdrawn. Moreover, because dependent claims 2, 3, 5-11 and 31-35 all recite additional patentable subject matter, the rejection of these claims as unpatentable over KOKUBO should also be withdrawn.

Claims 27-29 are rejected under 35 U.S.C. §103(b) as being unpatentable over BAM in view of BROCKMAN. The rejection asserts that BAM is silent as to the specifically recited evaporator types, but that it would have been an obvious design choice to select one of the recited evaporator types, as evidenced by BROCKMAN.

As noted above, BAM does not teach the instantly-recited high pressure pump. BROCKMAN is also silent in this regard, and so does not cure this defect. Accordingly, it is respectfully submitted that no combination of BAM and BROCKMAN teaches or suggests the apparatus recited in claims 27-29, such that this rejection should be withdrawn.

Claim 4 is rejected under 35 U.S.C. §103(b) as being unpatentable over KOKUBO in view of AKE. The rejection asserts that KOKUBO is silent as to the reaction section being filled with balls of various sizes, but that AKE teaches a static mixer in the form of a pipe filled with balls of various sizes.

It is respectfully noted that this rejection does not establish a *prima facie* case of obviousness at least because AKE is directed toward a system for mixing a polymer into city water, thus does not comprise analogous art. The person of ordinary skill in the art of equipment for producing fatty acid methyl ester simply would not look to art directed toward treatment of city water for design of a fatty acid methyl ester production apparatus. At least for this reason, there is no motivation to combine

KOKUBO and AKE. Accordingly, it is respectfully submitted that the rejection of claim 4 over KOKUBO in view of AKE is improper, and should be withdrawn.

Claim 12 is rejected under 35 U.S.C. §103(b) as being unpatentable over KOKUBO in view of MURRAY. The rejection assets that KOKUBO is silent as to the reaction section comprising an ultrasound device, but that MURRAY discloses use of an ultrasound devise for agitating or emulsifying liquid mixtures.

As noted above, KOKUBO does not teach the instantly-recited high pressure pump. MURRAY is also silent in this regard, and so does not cure this defect. Accordingly, it is respectfully submitted that no combination of KOKUBO and MURRAY teaches or suggests the apparatus recited in claim 4, such that this rejection should be withdrawn.

Claims 13 and 24 are rejected under 35 U.S.C. §103(b) as being unpatentable over KOKUBO in view of POOL. The rejection states that KOKUBO is silent at to a separation unit comprising a filtration unit, but that POOL teaches such separation of fatty acids and their derivatives by filtration. As for claim 24, the rejection states that the filtration unit of POOL inherently comprises a multiphase filter.

As noted above, KOKUBO does not teach or suggest the instantly-recited high pressure pump. POOL is also silent in this regard, and so does not cure this defect. Accordingly, it is respectfully submitted that no combination of KOKUBO and POOL teaches or suggests the apparatus recited in claim 13 or 24, such that this rejection should be withdrawn.

Claims 14-23 are rejected under 35 U.S.C. §103(b) as being unpatentable over KOKUBO in view of POOL and further in view of MULDIHARA. The rejection cites KOKUBO in view of

POOL for the reasons noted above. The rejection states that KOKUBO and POOL are silent as to the recited structural elements comprising the filtration unit, but that MULDIHARA teaches such separation units.

As noted above, neither KOKUBO nor POOL teach or suggest the instantly-recited high pressure pump. MULDIHARA is also silent in this regard, and so does not cure this defect. Accordingly, it is respectfully submitted that no combination of KOKUBO, POOL and MULDIHARA teaches or suggests the apparatus recited in claim 14-23, such that this rejection should be withdrawn.

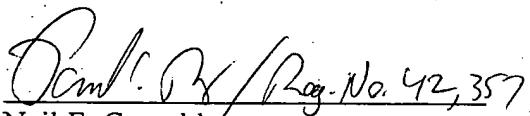
Claims 25-30 are rejected under 35 U.S.C. §103(b) as being unpatentable over KOKUBO in view of BROCKMAN. The rejection asserts that KOKUBO is silent as to whether the separation unit may comprise a distillation unit comprising at least one evaporator and at least one condenser, or whether a distillation unit comprising at least one evaporator and at least one condenser may be provided downstream or upstream from the separation unit. The rejection asserts that it would have been obvious to use a separation unit such as that of BROCKMAN.

As noted above, neither KOKUBO nor BROCKMAN teach or suggest the instantly-recited high pressure pump. Accordingly, it is respectfully submitted that no combination of KOKUBO and BROCKMAN teaches or suggests the apparatus recited in claims 25-30, such that this rejection should be withdrawn.

CONCLUSION

For all of the reasons it is respectfully submitted that independent claim 1 recites patentable subject matter. Moreover, by more narrowly defining the subject matter of independent claim 1, each of the dependent claims is also patentable. Allowance of the application with an early mailing date of the Notices of Allowance and Allowability is therefore respectfully requested.

Respectfully submitted,
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